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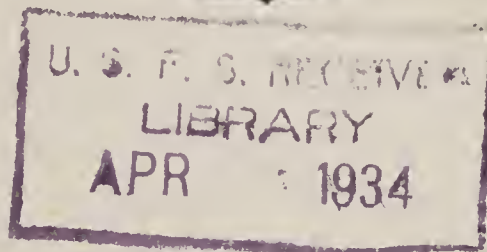
DECEMBER 15, 1932

EXECUTIVE AND PERSONNEL

MANAGEMENT

ON THE

NATIONAL FORESTS



A MEDIUM FOR THE EXCHANGE OF IDEAS AND
EXPERIENCES BY OPERATING EXECUTIVES
FOR THE BETTERMENT OF THE
SERVICE

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THE USE OF COSTS

by

ANDREW HUTTON, *Forest Supervisor*

San Juan National Forest

The purpose of cost accounting, as stated in the Cost Accounting Manual, is to furnish information for the preparation of reports, to secure activity, functional and unit costs for use in more efficient and economical use of funds and to control the cost of management of resources in relation to public benefit derived therefrom.

Since one of the fundamental requirements of every successful private business is an accurate and usable cost accounting system, it is only logical to assume that the successful and efficient management of Government business also requires such a system. There has been much argument pro and con as to whether Forest Service work can be compared with private work. Without any doubt, there is a vast difference, principally because private business is conducted primarily for profit, whereas in Government business public benefit is no doubt the chief aim. Even with this and other differences, there can be no successful argument against the need for and use of an accurate cost accounting system in Government work. The information furnished by every cost accounting system is primarily for the purpose of "comparing costs with results" and the Government, especially in this day and age, needs to do this just as much, if not more, than private business.

There should, therefore, be no argument against the need for some kind of a cost accounting system. Whether our new system is the right one may be questionable. Doubtless it has its faults. Nevertheless, it is a great improvement over anything we have had in the past. It gives us more accurate costs in a more usable form. As time goes on, no doubt, it will be improved and those who now think it is too detailed may be surprised in the future to discover that to use it to the greatest possible advantage, it is in reality not detailed enough. And with that increase in detail will come more accuracy and more usable information. We cannot get usable cost data without detail. We must have detail to usefully analyse costs and compare them with results. There is no use going half way in the matter.

Industry has long since quit arguing about the need for accurate and usable cost figures. Cost accounting is indispensable to industry. Innumerable instances are of record in industry of the good results of using cost figures. Our cost accounting system is in its infancy, but we have made a start. The question is what are we on the Forests going to do with the information that cost accounting gives us.

There are probably many Forests that have made much more use of the new cost accounting system than the San Juan. Frankly, we have made comparatively little use of it, but the question is not so much what use has been made of it as it is what use can be made of it. The San Juan was one of the Forests on which the new system was first tried. Since its adoption we have made it a practice to prepare and issue to rangers, at the end of each fiscal year, a cost statement by activities by ranger districts. In issuing

this cost statement it has been definitely pointed out to rangers that costs do not tell the whole story but that in every case costs must be measured with results. Comparisons were made between ranger districts and between costs by years on the same district and other possible comparisons that could be made were pointed out to them. What has been the result? If nothing else, it has made us think. It has made us compare the cost of our work by units and activities with the work of others. It has tied our work down to a cost basis and resulted in a comparison of costs and results. Ranger district costs have, as a result, come more and more into justifiable balance, not alone in the expenditure of actual cash but also in the budgeting and actual use of time.

To be useful costs must be readily available at all times. For that reason costs should be posted currently and by that I mean all costs including salaries and wages.. It is essential that "time" costs be posted currently to cost records by activities, units or projects from Forms 26. If this is done a supervisory officer may at any time know the cost of any particular project or activity and through inspection he can measure costs with results in many although not all cases in time to "lock the door before the horse is stolen." At the present time we do a lot of inspection and we approve or condemn almost entirely on the basis of results without measuring results with costs. Our present cost system should be adjusted to that need and should be used for that purpose. If we wait until the end of the fiscal year, as we must now do, certain use of costs can of course be made, as cited above, but the necessary corrective measures can in that case not be fully applied in many instances until it is too late. As an example, two rangers may each be building a trail. Both are doing good work. Inspections are made. Memoranda are prepared. Both men are complimented on the good work being done. Little or no attention is paid to costs at the time inspection is made. At the end of the fiscal year we are surprised to learn that one trail cost considerably more per mile than the other. It is then too late to apply corrective measures if such were necessary. The same is true of other lines of work.

It has been stated that our work plans are time budgets. With the advent of the new plan of work and by the use of standards, we have made some progress in budgeting our time. Suppose we convert that time into dollars when our time budgets are being set up. Suppose we consider what the individual jobs or activities are costing or will cost in dollars and not consider the time element only. I believe that I am safe in saying that if we did that we would be apt to make some adjustments. To date this has been used only to a very small extent on the San Juan, but it has been used with the result that some budgets of time have been adjusted. The expenditure of dollars should mean more to us than the expenditure of "hours."

It has been said that a "budget is not a lot of figures about sums of money to be set aside for definite expenditures, nor is it a series of graphic charts, nor multitudes of sheets indicating limits not to be exceeded. It is a psychological devise. Its primary object is to make people think." No doubt budgets of time in the form of our present work plans have made us think. Convert those budgets of time into budgets of dollars and I am convinced that they will make us think even more. Get the man on the

ground who is responsible for the costs, to think in terms of costs and I believe that the effort will be more than justified by the results.

Take any activity on your Forest and convert the time spent on that activity into costs in dollars. Can you justify the cost by results obtained? As an example, take grazing supervision or inspection. How many ranges have we today after 25 years or more on which we have been inspecting the range and stating annually "the lower range is overgrazed and the upper range is undergrazed." We have given at least some consideration to the time used. We still set up a budget to do this job in our work plans, but we haven't always gotten results. Suppose we now convert that time into cost. Don't you think that we would be more apt to get results if we realized that it was costing us many dollars to do that work rather than that we were spending only so much time on it. I am inclined to believe that we would.

Costs have and will be used in setting up allotments and to determine the amount of funds needed to do a certain job. The more detailed these costs are, the more useful they are. This applies to all lines of work. We have all used costs for this purpose.

Costs have also been used to justify the construction of improvements. The mere need for an improvement must not be taken as the full justification of that improvement. Possible results must be considered also. The need for the improvement, its estimated cost based on cost records for similar projects and its probable benefit or results must all be weighed. Above all, its probable future maintenance cost must be considered for that also is a cost.

Just one more word as to the need for detailed costs. Every Supervisor is interested in the cost of administering his Forest. He uses the Forest cost statement gotten out each year and compares his costs one year with another and his Forests with other Forests. Suppose his costs have increased. Can he justify them? Can he put his finger on the unit or activity that caused that increase? Perhaps he can but I'll wager he can't without an analysis of the costs. Suppose, for example, they are even lower than in previous years. What caused the decrease? Can a further decrease be made without sacrificing results? To know that a certain cost has been decreased is not enough. He should know if it can or can not be decreased. But how can he get all this information. Only from an accurate unit and activity cost record. Even with our present activity cost system we will, I believe, soon find that many expansion accounts will be needed from year to year. As an example of this, let us take Grazing, S&G. Suppose you have two ranger districts, each grazing approximately the same number of sheep. The fiscal year cost statement shows that one man spent 25 per cent more money on this activity than the other ranger. Was or was not this expenditure justified? This can only be determined by securing itemized costs of the various jobs that enter into the activity and comparing these costs with results. Split the activity up into its various jobs, such as taking applications, approval of applications, counting stock, driveway supervision, inspection, etc., as provided for in the present accounting system, and perhaps the resulting cost statement by expansion accounts may shed some light. In the not too far distant future, I believe that we will be using many expansion accounts for the

purpose of analyses and I am convinced that we have just started with cost accounting.

The present system of cost accounting will give us all the costs we need under present conditions. Our need is to make use of those costs. If we cannot make use of them there is no use keeping them. Costs of themselves are worthless except that they furnish data for reports. But reports on costs or anything else are worthless unless they can be and are used. It is my opinion and experience that we can use costs to advantage and the more detailed they are (consistent with cost of securing them) the more valuable they will be.

It is my opinion that every Forest needs the following:

1. Costs by Ranger districts.
2. Costs by activities with sufficient expansion accounts used annually to iron out difficulties.
3. Costs, including time costs, posted currently so that the total cost of any activity, unit or project may be ascertained at any time during the year.
4. And above all, the application of these costs in our everyday work so that results may be tied to costs and corrective measures applied before it is too late.

Now that we have a cost system let us either apply it or discard it. In the past we have not been cost minded. We haven't been taught to use costs as measuring sticks. We haven't been led that way. I make this last statement not at all in the spirit of criticism but rather as a suggestion that perhaps we have all been overlooking something.

If industry had not studied costs and applied the results of such study, we would be paying as much today for manufactured articles as we did ten years ago with no increase in quality. There can be no question but that it was primarily through a study of costs that industry was able to decrease manufacturing expense, increase profit to stockholders and furnish the purchasing public with better products at a reduced price. And is that not our aim in Government work? Surely we want to furnish the general public with better service at less cost and, if that be true, surely we cannot afford not to become cost minded and actually use costs to that end.

VARIATIONS THAT CAN BE SECURED UNDER THE COSTKEEPING INSTRUCTIONS

by

STANLEY F. WILSON, *Region 3*

Under the caption "Distribution of General Overhead" the following instructions are found on pages 46 and 47 of "Service Cost Accounting":

"The hours used for distribution of overhead will be based primarily upon the hours worked as shown in the 'Salaries' column, *excluding the time shown for activities which are not to receive overhead*. Normally, the time of all employees engaged on general administrative work will be included *but when this method tends to place too much overhead on certain activities it should be further modified by decreasing the number of hours shown for activities clearly out of line*. For example, when the time of a number of 'Scalers' is included, the number of hours for Timber Sales is apt to be so great as to draw an unwarranted amount of overhead. *When such conditions exist it will be necessary to exclude all or part of the time of certain employees in order to attain an equitable distribution.*"

The italics are mine. The sections so marked offer opportunity for great variations and, to my way of thinking, all kinds of abuse in the keeping of our cost records. Who shall judge "when this method tends to place too much overhead on certain activities" and that it should be "modified by decreasing the number of hours shown for activities clearly out of line"? If, for example, Washington pressure is being applied particularly to reducing grazing costs, the way is left open to manipulate the figures somewhat by expanding the base to include more direct time on timber sales—the time of assistants on project sales, for instance. The extent to which this manipulation is possible is indicated by compilations given below from fiscal year 1931 costs for two Forests:

STATEMENT SHOWING

Percentage of Overhead Charged to Productive Activities, using (1)° time of all regular yearlong employees (from whom we have direct time charges), and (2) time of rangers and men in charge of project sales only.

F. Y. 1931

Production Activities		COCONINO NATIONAL FOREST			
		(1)		(2)	
		Hours	%	Hours	%
009	Fire Prevention	288	.84	33	.17
100	Pre-Suppression	1,930	5.60	1,526	7.92
101	Fire Suppression	1,126	3.26	900	4.67
110	Roads & Trails—Construction	3,782	10.96	1,085	5.63
111	Headquarters Imp.—Construction	1,198	3.47	327	1.70
112	Other Imp.—Construction	1,873	5.43	158	.82
120	Roads & Trails—Maintenance	1,001	2.90	675	3.50
121	Headquarters Imp.—Maintenance	1,532	4.44	824	4.28
122	Other Imp.—Maintenance	1,662	4.82	1,031	5.35
013	Timber Sales	3,296	9.56	1,876	9.74
014	S-22 Sales	41	.12	30	.15
015	Forestry Extension	56	.16	52	.27
016	Timber Survey	2,243	6.50	1,163	6.04
017	Reforestation & Nurseries	30	.09	14	.07
018	Free Use	137	.40	133	.69
019	Timber Stand Improvement	6	.02	0	—
020	Research—S. & P.	56	.16	56	.29
021	Grazing Administration	7,621	22.07	6,551	34.00
022	Grazing Reconnaissance	1,505	4.36	80	.42
023	Grazing Investigations	146	.43	79	.41
024	Fish and Game	364	1.06	292	1.52
025	Land Adjustments	808	2.34	704	3.65
026	Acquisition and Exchange	356	1.03	140	.73
027	Special Uses & Rts of Way	1,186	3.44	1,170	6.07
028	General Surveys & Maps	65	.19	51	.26
029	Recreation	2,193	6.35	317	1.65
		34,501	100.00	19,267	100.00

(1) Includes:

- 7 district rangers
- 1 asst. ranger
- 1 timber sale project man
- 2 timber sale assistants
- 1 truck driver
- 1 improvement ranger
- 1 road project man
- 1 man in charge of a Natl. Monument
- 1 timber sales staff man
- 1 grazing specialist
- 1 asst. supervisor

(2) Includes:

- 7 district rangers
- 1 asst. ranger
- 1 timber sale project man

Production Activities		SITGREAVES NATIONAL FOREST			
		(1)		(2)	
		Hours	%	Hours	%
009	Fire Prevention	126	.45	20	.10
100	Pre-Suppression	762	2.70	513	4.30
101	Fire Suppression	811	2.88	615	5.17
110	Roads & Trails—Construction	754	2.67	552	4.67
111	Hdqtrs. Imp.—Construction	564	2.00	479	4.00
112	Other Imp.—Construction	923	3.27	614	5.10
120	Roads & Trails—Maintenance	212	.75	175	1.50
121	Hdqtrs. Imp.—Maintenance	604	2.14	440	3.70
122	Other Imp.—Maintenance	1,339	4.76	710	6.00
013	Timber Sales	10,737	38.09	2,902	24.20
014	S-22 Sales	65	.23	49	.40
015	Forestry Extension	45	.16	3	.02
016	Timber Survey	2,718	9.65	897	7.50
017	Reforestation & Nurseries	4	.01	—	—
018	Free Use	12	.04	11	.10
019	Timber Stand Improvement	21	.07	—	—
020	Research—S. & P.	23	.08	—	—
021	Grazing Administration	3,344	11.87	2,370	19.48
022	Grazing Reconnaissance	2	.01	—	—
023	Grazing Investigations	14	.05	8	.06
024	Fish and Game	388	1.38	296	2.50
025	Land Adjustments	491	1.74	204	1.70
026	Acquisition and Exchange	3,111	11.04	677	5.70
027	Special Uses & Rts. of Way	727	2.58	393	3.30
028	General Surveys & Maps	353	1.25	33	.30
029	Recreation	35	.13	24	.20
		28,185	100.00	11,985	100.00

(1) Includes:

4 district rangers
2 timber sale project men
7 timber sale assistants
1 supervisor
1 asst. supervisor
1 executive assistant
1 clerk

(2) Includes:

4 district rangers
2 timber sale project men

A comparison of the two columns for each Forest shows how widely divergent the percentages for the various activities become with the different bases. Under the instructions either system could be adopted or some other one in between. I believe this illustrates the danger of allowing so much leeway in establishing the base on which proration of overhead is to be effected. It also indicates the importance of using a uniform system between Regions. It is a fact that figures, however attained, will be used for comparisons. It is important, then, that the figures be secured in a uniform manner.

It would be highly arbitrary at this time to say that this or that base for prorating overhead is right and some other wrong, because after all no one really knows as yet. We are still more or less experimenting. My present tentative suggestion as a probable fair base for prorating overhead comprises the direct time of the following: (1) Supervisor and his staff, including clerical, and road superintendents assigned from the Regional Office, but not including Regional Office chargebacks; (2) district rangers but not their administrative guards, protective guards, or regular assistants. (If any uniformity is to be established between Regions, we will have to eliminate assistant rangers from the picture because in some Regions assistant rangers are used and in others administrative guards for much the same work. We should include both or neither in our base, and I believe the latter preferable); (3) men in charge of projects requiring supervisor office supervision, but not their project assistants. (This would include the officer in charge of a project sale, a road foreman in charge of a considerable project, chief of reconnaissance, land evaluation, timber survey, insect control, or other party—thus treating parties as units comparable with ranger districts. It would not include party or sales assistants or temporaries in charge of small construction or other jobs under ranger supervision primarily); (4) Improvement rangers or officers engaged in individual grazing reconnaissance or other specialized ranger calibre work, who would be working more particularly under direction of the supervisory staff than under district ranger control.

After the period of experimentation and discussion, a definite policy should be prescribed by the Forester.

DETERMINATION OF THE NEED FOR TEMPORARY SUMMER STATIONS AND PASTURES

by

ALVA A. SIMPSON, *Supervisor*, Beaverhead National Forest

In view of the extensive and varied expenditures made for the improvement of our National Forests, it has appeared to me necessary that before any improvement is made its justification as a reasonable investment by the Government should be assured.

Expenditure of Government funds merely as a means of affording comfort is unwarranted. There are temporary stations in our National Forests that cost the Government more to maintain, per night of use, than would be charged for the best room in the best hotel in New York.

As a means of determining the need and advisability of investing in summer stations on a mountainous and, by road, inaccessible portion of this Forest, certain time studies were made. The objective was to determine if the interest on investment, depreciation, maintenance, and equipment necessary at the temporary station would be justified by a saving in administrative cost plus an attainment of the standards of administration set forth in our analyses. The area studied—some 138 sections of inaccessible-to-motor country, which is wholly accessible by existing trails; hence, no additional trail expense was considered. Based on recorded costs, investments, etc., are as follows:

	Investment Cost	Interest @ 6%	Depre- ciation	Maint.	TOTAL
Cabin	\$250.00	\$15.00	\$12.50	\$12.00	\$39.50
Pasture	100.00	6.00	5.00	8.00	19.00
Equipment	75.00	4.50	7.50	5.00	17.00
TOTALS	\$425.00	\$25.50	\$25.00	\$25.00	\$75.50
Cost of stocking with provisions					6.00
TOTAL YEARLY COST.....					\$81.50

The set-up for inspection and supervision for the area provided for two complete range inspections, and such follow up as required to secure compliance with range management standards, which averaged 20% of one inspection trip.

The analysis estimate for one inspection, with no back-tracking, was nine 8-hour days using a pack outfit. The time study indicated an average speed of 2.41 miles per hour with a pack outfit, and an average speed of 3.12 miles per hour without a pack outfit. A complete inspection requires 155 miles of horse travel.

2-1/5 inspections required each year—totalled 341 miles of horse travel. Using pack outfit, 141.5 hours were required, using saddle horses only 109.3 hours were required. The saving in actual travel time was 32.2 hours per year. Based upon an 8-hour day of actual inspectional work, the pack outfit required an average of 1.37 hours per day additional time for hunting horses and making and breaking camp, totalling 24.3 hours for the year. The total saving in time, was, therefore, 56.5 hours per year; or 7.07 days. The value of a ranger's time, plus subsistence, is usually figured at \$1.00 per hour for analyses purposes. The time saving in this example is, therefore, \$56.50, while the improvements contemplated would cost the Government \$75.50 per year plus cost of stocking, or \$81.50, thus indicating that no actual saving to the Government would result from an investment in an administrative summer station and pasture. We might get a rude awakening if we divided the number of days of actual use into the actual cost to the Government of maintaining a temporary station and considered the cost per day for this housing service.

REVIEWS

Cost Accounting Through the Use of Standards—Published by the Chamber of Commerce of the United States.

In any profit making industry it is necessary to give considerable attention to costs. If costs go up profits are apt to go down. Yet no manufacturer ever knows exactly what a particular article has cost him, and if he did the information would be of no value to him. It would then be too late if unfavorable to do anything about it. Yet costs must be controlled somehow.

In this machine age with its thousands of machines—automatic screw machines, die-casting machines, bottle machines—in the factory and the auto in our private lives, we have come to expect a machine to perform “up to standard”. If your car isn’t working up to standard you recognize it at once and take it to a garage and have it tuned up.

It is the possibility of doing this same thing with their plant that managers in industry are working for. They look upon the entire plant as a machine and try to keep it constantly up to standard. In doing this it is customary to keep cost records. Some of these records tell him things he can use, and some, too frequently, do not.

While there are almost as many cost systems as there are industries, in general they may be divided into two groups—the job-cost system and the standard cost system. The tendency is said to be away from the former toward the latter.

In a general way the job-cost system tries to keep a record of the costs of production as the work progresses. So much material is issued at a certain price, each laborer keeps track of his time and it is then figured in at the appropriate rate. In the end this is all added up to get the total cost. By this system the tendency is toward a great deal of detail involving a lot of expense.

The other system sets up in advance a standard cost. This of course is based on the best records available—records of what should or can be done, not necessarily past actuals. The standard is then used in sales, in planning, and in budgeting. Such records are kept as will be needed in future planning and in current administration. The manager uses the standard as a guide. He tries to keep his organization “up to standard”. To know that he is doing this requires records, but what records and how many is a problem. You should keep only what you can use.

But what are they used for? In general they have just two uses: planning for the future, and supervision as you go along. For example, suppose you are making electric bells. Your records show that this month it cost you 49c each to make them, last month 47c, and the month before that, 52c. The price is fixed by competition not by costs. You have your record; what will you do with it? Will you plan to make them next month for 47? How? All you have is an “inquest” record. It won’t tell you what to do. It doesn’t tell you why the variations.

What more do you need? You need a record that will point out to you any significant variation from standard and do it, not after, but while

the operation is in progress. For this you will need standards, not so much for the finished product, as for the items where variations may be expected. An electric bell is made up of parts. You will need to watch each part.

And costs are made up of three parts—material, labor, and overhead. You will need to keep these separate. By the job cost method you are apt to figure the cost of each individual part. By the standard method you learn to take short cuts. The standard helps you to do this.

For example, a part costs you standard 3c each. The labor is 1c. The standard rate is 60 per minute. Suppose the rate of production drops to 40 a minute, your cost goes up to 1½c. Your record shows this not at the end of the month but right now. This gives you a chance to look into it. Perhaps it is due to a new man or an old machine. In either case you fix it up and get back to standard.

In commenting on this method Mr. E. F. Roberts, Vice-President, Packard Motor Car Company, said:

“Until a few years ago we followed the identification method which prevails in most factories. That is, we allocated the labor and material to particular lots which were distinguished in their progress through the factory by factory order numbers and we had the usual rigamarole of material requisitions, time slips, and so forth * * *.

“But by not finding out separate costs except when we have to know them, we are saved the expense of maintaining an elaborate system of inspecting, accounting, and cost recording. * * *”

In general then, the cost standard system is this: Standard costs are set up for all items needing control. These standards are then used in selling, in planning, and in supervision control. The manager has only to compare his actual costs with the standard to determine how well he is running his job. In fact he pays little attention to costs as long as standards are met. His accountant watches the record continuously. If there is any significant variation from standard he calls it to the attention of the manager. In fact, this is its chief advantage. It does show up variations, and the manager needs not worry about costs unless there is something to worry about. In fact, he doesn't worry at all. The system shows him where the trouble is and he goes to work on it.

In addition to this adaptation for pointing out significant variations in time for the manager to correct the difficulty and save expense, the method has the additional value of usually being cheaper. It often permits of short cuts or sample methods that cut down the volume of records.

For example, suppose you are insulating copper wire with silk. The silk is expensive, so you must be careful not to use too much, yet quality demands that you use enough. To continuously measure the silk is expensive. But by the standard method all you need is an occasional sample. Once in a while, the frequency determined by experience, you weigh a section of wire to compute the weight of the silk. Any variation from standard is quickly caught and at a minimum of time and record. Likewise the labor charge is determined by totals for periods of time—whatever fits the case—hour, day or week or by sample runs taken occasionally as needed.

Variations of this sample method may be used in many places and at

savings in record. The danger is in choosing a sample that will not tell the whole story or one that may be interpreted in two or more ways. But however obtained, actual costs compared with predetermined standards gives the manager a control over operations which can be secured in no other way.

As to the accounting technique for doing these things, I will pass that over lightly. There are a number of ways of doing these things that would be of interest to accountants but not to executives. As said before costs include material, labor, and overhead. These must be recorded and standardized separately. Variations in cost are due, first to variations in unit costs of material and unit wage rates, second, to variations in efficiency of use of materials and labor. These two must be separated. One way of doing that for material is to carry a material profit and loss account to which all variations from the standard costs are charged. The material then would always be charged to the production executive at the standard rate. If his materials cost goes up he knows that it is either waste or faulty material and can look into it. It fixes more definitely his responsibility by eliminating the variation due to purchasing—another's responsibility. There are other accounting devices for doing the same thing. In a similar manner variations in wage rates can be taken care of.

Overhead of course is a big factor. Some of this can be controlled by the production executive and some cannot. In as far as possible, expense items should be standardized and watched the same as materials and labor.

As usual, I try to see wherein the principle or method discussed in the article reviewed is applicable to our own organization. It is true that we are in a producing business but our plant can scarcely be called a factory. We produce services and raw materials. Yet we have expense that you as operating executives try to control. Also we have cost records and we have standards. It looks, therefore, like we were all set to go, on this system, but a careful examination shows just one little hitch—the cost records and the standards do not correspond.

I refer of course to the standards in the work plan which are cost standards for time, our biggest cost factor. This so-called plan is partly a plan and partly a budget, but since a budget is a plan the distinction doesn't mean anything. These standards were established as discussed in the article and are revised and improved in the same way. In fact the whole set-up is made to order for cost control purposes. But unfortunately the cost accounting was not correlated. That is partly my fault I presume, but anyhow it is a condition that exists regardless of how it happened.

However, if the system is worth while the correlation is simple. I understand that it has been made on some Forests. When done the Supervisor has a new tool for current control. His accountant would watch the records for significant variations from standard, just as one executive assistant explained last month. Such variations would be reported to the Supervisor not at the end of the year when costs are summarized, but currently while there is time for correction.

For example, the standard calls for so much range work in July. The record shows it isn't being done. The Supervisor investigates and finds

why. Perhaps he switches another man over to help out, or perhaps conditions do not warrant the standard amount of work this year. Anyhow the point is that the Supervisor is supervising. He is keeping in touch with work progress, helping to get it done, and knows that it is done. Records help. Such as do not should be dropped.

* * * *

Costs Show Where You're Going—Expenditures Show Where You've Been.

By CHARLES C. JAMES, *Consulting Accountant.* Factory and Industrial Management for September.

The idea sponsored by this article is so nearly that of the one just briefed that I will touch it very lightly. This also advocates the idea that costs should look to the future, not the past. The basic proposition is that all costs must be estimated initially.

To illustrate his point the author goes back to the war time Government ship yards. One yard built 40 ships. The first was finished in 1917 and the last in 1920. But it was not possible to know the actual cost of the first until two years after the last was finished. In that two years the yard was dismantled and as much material as possible salvaged. The proportionate cost of dismantling with credit for salvage was necessary to know the cost of the first ship, or the last, and by that time the cost was merely an historic fact of no particular value.

So costs for use start with an estimate which can be compared currently with the actual. This comparison gives the manager the information he needs for current control. It shows him which factors need his attention. The following form gives the idea as to how it may be worked:

OPERATING STATEMENT—FEBRUARY

Activity	Basis of Current Budget	Budget		Actual Current Period	Over or Under Current Budget	
		Normal	Current Period		Current Period	Year to Date

In this case the budget represents the operating standards. Each month the budget estimates are compared with the actual. Anything out of line will be investigated. Being out of line does not necessarily mean that anything is wrong. It may be out of line and still be right, but the manager would need to investigate just the same. The budget does not control; it merely is an indicator as to where control is needed. And as said before, it is interesting to note that we have all the basic material for this sort of system if we want to use it.

It is also extremely interesting to me to see how closely the above form, prepared by an accountant in New York, meets our needs for a follow-up on work plans. It is actually better than some of the methods in use a few years ago. In fact if you further divided each column to show "office" and "field" or "office" "travel" and "job" it wouldn't be bad at all. Under "activity" you would enter the jobs for the month. "Basis of current Budget" we scarcely seem to need since the basis of our time estimates for all jobs is practically the same. "Normal" has not been given special

attention in the past, but I find it discussed in the Forester's AS(O) Ranger District Analyses letter of July 1, 1932. Ordinarily the normal time for doing a job is the time set-up for the current period, but need not necessarily be so. If they differ there would be an advantage in stating both. It would show that you knew what the normal cost should be and that you had some special reason for allowing more or less for this period. Of course our work plans are not complete cost budgets. They are, however, time budgets—our principal cost in most activities.

Note: Unfortunately the manuscript for the reviews in number 13 became disarranged. If you care to read them as written, read page 7 down to include the fourth line in the third paragraph, then turn to page 9 and begin with "but here" in the fifth line. To read the second review, read down to include "cease" on page 9, then turn back to page 7 and begin with "to think about it" in the middle of the third paragraph. I'm awfully sorry this mixup occurred for there is a thought in that "Self education for management" review that I wanted you to get.

P. K.

SUGGESTIONS FOR DISCUSSION

We have given you three papers on costs from three different points of view, but all in relation to the use of cost records. The first is a general discussion of the administrative application of our new cost records. The second might be called a discussion of a negative use, since it points out the danger of making comparisons or drawing conclusions without first investigating the base. It is not a criticism but a necessary step in understanding and developing what we have.

The third paper is a special cost study. It presents a method of determining on the basis of costs which system of administration is preferable. In both cases the quality standard is the same. With the improvements, time is saved on inspection but this is offset by depreciation and maintenance. If it is our policy to give standard quality service at the lowest possible price, is there any other method than by studies of this kind that we can know that we are doing so? The method is applicable to hundreds of things other than the use of cabins on the range.

For example, a Supervisor in Region 4 is making a study of the comparative cost of treating posts with creosote and smelter dust. The treating cost per post is \$.2543 and \$.1486, but how long each will last is not yet determined. He also made a similar study of the cost of making sales by tree measurement as compared with scaling, and a number of other things where administrative decisions had to be made. Everyone, I suppose is doing the same thing, more or less.

However, the thing we need most to consider at this time is, how are we going to get our money's worth out of our new cost system. Suppose we apply Simpson's method to it. Like the cabin, it costs us something. If it does not somewhere show a saving to offset that cost how can we justify having it? This idea is all right but that is hardly a fair way to put it. "It" cannot in itself save anything. If we do not use it, it will be a non-productive expense, it is true, but that does not necessarily condemn the system unless it is not adapted to use. The fault may be in us, not the system. But like any other new tool, we will have to learn how to use it. We learn from our own experience and from others. To broaden our experience we must make tests, try experiments and analyze results. To learn from each other's experience we must have some way of finding out what others are doing. Possibly we can learn from what is being done in other organizations.

The two articles reviewed are suggestive from that point of view. At least they are interesting in showing how closely we are paralleling what is being done in the best industrial organizations. We have plans which are in line with the best in planning. We and they try to forecast what we can do during the year and what it will cost. In our plans, in part, we forecast in time instead of dollars but it amounts to the same thing. We now have a cost system by which we can determine our costs in the detail we need. The articles reviewed suggest uses.

The difference between our method and theirs is that we have not made the close association that they have between plans and costs. With them the cost record is a plan record. Without the close association we will not

be able to get the principle use that they are getting.

As Hutton points out, our work plans are time budgets (which could easily be converted into dollars, as budgets are usually expressed). To budget our time we need a record of how much time is required to do the job. That is, to do a reasonably good job of planning we need time records and time standards. These we can get from our cost records. So it seems that we can use our cost records in perfecting our plans.

Hutton also mentions "comparisons"—comparison of cost with results, comparison of one method with another (as Simpson did), comparison of one man's work with another's, etc. But most important of all, it seems to me, is the comparison of a man's cost with his plan. For example, I have a copy of one of Hutton's comparative cost statements, which he mentions but does not include. In that I find that G-C&H cost .223 per head on one district and only .084 on an adjoining one. All that means to me is that grazing administration cost more on one district than another. Both may be too low or too high. There is nothing to indicate. But suppose I had the plan of the man whose cost was 8 cents and found that the estimated work was 9 cents. Would that not be a good indication that he had done a good job?—not proof, just an indication. But suppose his plan had indicated work amounting to 24 cents? What would you think? My reaction would be that either the plan or the work was wrong. I would want to find out which. And next year I would try to correct the one that was wrong. That represents the use of costs in planning. It is too late to correct last year's work. But if costs had been watched currently, possibly some adjustment could have been made before the end of the season.

So far we have discussed only the operating costs. Most of you, I presume all of you, recognize their value, but how about depreciation? Isn't that just a lot of work for nothing? Well, Simpson has given us one use for depreciation costs. If in his problem you consider only the time saved in the operation, or work cost, you do not have a fair comparison and are apt to be lead into an unwise decision. That has been done.

Another very important use has recently developed. As you know there has been a lot of criticism of Government work of all kinds. One criticism is that Government Bureaus are doing construction work at greater cost than the same work would cost by contract. Further, that the Government departments do not know their real costs. A Congressional committee investigating these charges, recently sent the Service a questionnaire asking our methods of ascertaining the cost of projects, including depreciation on equipment, buildings, etc. They were particularly interested in depreciation since they had been told that we knew nothing about it. Fortunately we were able to answer their questions by quoting from our cost manual. Our system is superior to that of most contractors. It is possible that this one use will more than balance the total cost of installing the system.

As you know I am enthusiastic about costs and their use. But you also know that I have been away from direct forest work for years, so I'll turn the discussion over to operating executives. It is true that most of you have not had the new system long enough to get its use really started, but is it not time we are thinking about it? For as Hutton says, if we cannot

use it we ought not keep it.

QUESTIONS

1. Hutton's article: There are so many suggestive ideas that it is hard to single out specific things, however here are three that impressed me. Do not confine yourself to my three.

- a. Comparing cost with results in field on inspections.
- b. That the dollar value of time would mean more to us in our plans and reports than hours.
- c. The need for detail. Detailed job costs are much more useable than general activity costs. (Yet one Region has ruled against the use of expansion accounts.)

2. What do you think of the suggestion that our cost reports should be tied in more closely to our work plans—make them follow-up reports in fact. Some of you have tried this, I believe. Does it pay?

3. Simpson's and Wilson's papers, one or both.

4. For the benefit of others, who are working with the same problems you are, give us one or more examples of uses you have made of costs, either the regular cost records or special cost studies.

DISCUSSION OF LESSON 12

These discussions have been very interesting to me for a number of reasons. First, I used to have considerable direct contact with the problem and the discussions indicate in a way about where we now stand. Next, what one might call the psychology of the situation. Just why did the different men write from the particular angle that his discussion expressed? And third, when there are about a hundred supervisors in the country whom I know are interested in these problems, why is it that only three considered it worthwhile to say anything about it?

This last question set me to wondering, "Well, just what have we accomplished, if anything?" Frankly, I do not know. Perhaps the discussions will help to clarify the issue, and if so, progress will be made. At first, they were something of a disappointment to me. So many advocate undergrazing while the manual (p. 35-G) says our objective is "complete utilization of the crop, consistent, etc." And why, after nearly thirty years do so many talk as though our job is not "sustained production" but rehabilitation of our ranges. And why, after all these years, do twelve men have twelve ways of approaching a fundamental problem?

As I said above, that was my first reaction, but on reflection and study I find that it is not nearly so bad as that. When I compare these discussions with those of some fifteen years ago, I realize the progress that has been made, and also the possibility of these discussions adding something to that progress.

The problems here discussed are stated in such simple terms that we wonder that we did not think of them in just that way thirty years ago. But in fact we know that things don't happen that way in real life. Range management was a new industry. Things had to be learned a step at a time. As I see it now the new feature which automatically created a whole bunch of new problems was that we were raising an annual crop *which must be sold in advance of production*. How many corn farmers would be willing to sell their crop as a definite number of bushels a year in advance of harvest? They couldn't do it. It would be a new game they hadn't learned to play. The farmer knows that when he plants a hundred acres he may harvest only a thousand bushels or more than five thousand. He couldn't farm on an advance selling basis, but we had to. That was our first problem and it took us time to realize it and what it meant.

For years we used to talk of range management as something in the future, after we got an intensive reconnaissance and after we had had a "management plan" made for us by a range expert, and after various other evasions: but finally we realized that we were range managers, that we had the ranges and that they must and would be managed, the only question was how well. Since we fully accepted that responsibility, we have located, analyzed and specifically defined one problem after another. And as soon as they are isolated and defined they become relatively simple and someone soon finds the answer. Now, believe it or not, these few discussions, from one percent of the men interested are going to help to isolate and define not only the central problem raised by Clark but some three or four related problems.

First, as an organization we are coming to realize that the manager on the ground must have a definite idea (specifications) of just what his range should be. He must have this or he cannot know that he is attaining his objective—for that is his objective. What I think these discussions will contribute is a better understanding of the meaning of “definite”. It does not mean .6 density on each square yard of area, for that would be unnatural and impossible. Neither, does it mean an average .6 density over a million acres for that can never be accurately known. It does mean the best expression that can be made, using words, maps, pictures, plots, or any other medium, of what the range should be by types and subtypes on relatively small units, and based on *the best available information*. That is, we cannot afford to wait until we know just exactly what these specifications should be but that we would do the best we can with what information we have. At least, that is what I get out of these discussions.

Likewise, we should have and use the best known specifications for utilization, and other factors. You will get them yourself from the discussions. However, there is one other thing suggested, but not definitely stated, that I want to comment on briefly. That is, the growing realization of our responsibility for training our men, not in generalities, but definitely, and specifically, in the things we want them to do and know and recognize in our system of range management. And things do not have to be made “fool-proof” for our type of ranger. I have worked a lot with beginning rangers and I have always found them not only quick and capable but eager to learn. Anything that we have definitely worked out they grab in no time at all. They are looking for things to learn. As soon as we isolate and define a problem you will always find them, especially the new men, right with you. The thing that hurts their morale is evasions, side stepping or trying to hide behind “experience” or “science”. But as I said before, the greatest difficulty is to clearly define our problems. After that is done, someone, somehow, seems always to work out a solution. These discussions, will, I think, help to isolate three or four fundamentally important problems. Read them and see whether or not you agree.

P. K.

D. A. SHOEMAKER

REGIONAL OFFICE

ALBUQUERQUE, N. M.

Supervisor Clark's “Range Specifications” discussion raises a very pertinent range management question, viz: “- - what is the major objective in range management?” His reference to the “measuring stick” stated in Regulation G-12 gets at the heart of the question by indicating that more specific definitions are needed of conditions that will insure “permanency of forage production” or “its sustained productivity”. However, it is my opinion that it would be impossible to define such an objective for the whole Service that would be much, if any, more detailed and specific than that already in the Manual. To make it more specific, it would have to be brought down to smaller units. Supervisor Clark has attempted to bring it down to general vegetative types classified into sheep ranges and into cattle ranges for the eastern slope of the Continental Divide in Colorado and asks if his set-up is a good “measuring stick” for use in measuring qualitative forage conditions in that area.

I think Supervisor Clark is on the right track. It would appear that he could have brought in also the quantitative measure of forage conditions by showing the average reconnaissance density of each type or better still to have presented the average forage acre factor of each. He mentions "density" and "palatability" but discards the former because it "is more or less contingent upon edaphic conditions" and the latter "because of the existing uncertainties surrounding its determination".

The "density" and "palatability" factors should not be discarded. But to use them intelligently and effectively, it would be necessary to come down to still smaller units; possibly by types within a Forest or a division of a Forest. Sometimes it would be essential to determine the conditions that would be considered satisfactory for a certain type or types within an allotment. By so confining the area of application, the "density" and "palatability" factors could be used with accuracy and reliance.

As Supervisor Clark suggests, the Manual instructions under Regulation G-12 might be more specific in describing the *kind* of definitions that should be made of conditions that would be considered satisfactory. It might be advisable to have the instructions require that such definitions be made for whatever unit of range—Forest, Forest division, group of allotments, individual allotment—the necessary basic data are available.

"Utilization" is another important range management question for which specific objectives and measuring sticks are sorely needed. In this case, I think they can be determined and used on a broader scale, i.e., for larger areas than can those concerning composition, density, and palatability. We have definitions of proper utilization—what the range should look like at the end of the grazing season—for the general types that occur in the Southwest. They often apply directly to ranges on various Forests but in cases it is found necessary to insert modifications or more detail to take care of certain variations from the average that may be present only within a given allotment. In dealing with range conditions, i.e., density and composition, it is my opinion that it would be necessary to use smaller units than when dealing with utilization because very local factors other than biotic, such as soil, moisture and exposure, may affect density and composition which easily could lead to erroneous conclusion through the use of broad, general definitions.

Anyway, from a practical standpoint, our range management is by the allotment as the unit. Therefore, in actual practice, we set up certain objectives and action items and determine results under each management plan for each allotment. If one is going to be specific and positive in stating the major objective in range management, I don't believe he can go beyond the allotment as the unit in most cases.

Not long ago, I examined an exclosure that had been fenced some 5 or 6 years. Inside the "density" of vegetation was .6, outside it was .45; inside the "composition" was 20 per cent blue grama, 25 per cent Texas timothy, 10 per cent 3-awn, 10 per cent ring grass, 10 per cent prairie clover, 10 per cent estafiata, 5 per cent yarrow and 10 per cent miscellaneous; outside the "composition" was 1 per cent blue grama, 2 per cent Texas timothy, 15 per cent 3-awn, 70 per cent ring grass, 7 per cent snakeweed and 5 per cent miscellaneous; inside the "palatability" was 60 per cent,

outside 20 per cent. The conditions inside probably should not be considered as the ideal objective but they could be used intelligently in determining whether or not the trend that the surrounding range is making is satisfactory. However, in that case, that definition of conditions could be applied accurately only to that type in a very local area concerning only two or possibly three allotments.

In my opinion, Supervisor Clark's idea is worthy of further consideration, development and use. However, I doubt that Service-wide or even Region-wide objectives of the character that he describes could be employed. A number of sound principles have been developed that show the effects of biotic factors on plant succession. Those principles are treated excellently in Dr. A. W. Sampson's Department Bulletin No. 791, "Plant Succession in Relation to Range Management". To use those principles intelligently and effectively, it would be necessary to apply them locally. Supervisor Clark is correct in his opinion that the necessary information for such local application is not available in most cases. But we have made a start in some places and as time goes on we should be able to make considerable progress in carrying out the general idea that Supervisor Clark has brought to our attention.

HUBER C. HILTON

MEDICINE BOW

LARAMIE, WYOMING

Rather than a new or amplified objective in range management, I believe our need is to so manage our ranges that we achieve the objective laid down in the Manual. For more than 25 years we have been attempting to manage the range, and I do not believe we have been doing a very good job of it. The reason, I think, is because we have lost sight of the objective, and we do not adhere to plans as closely as we do in timber sale management for instance. For the period to date in range management our objective has perhaps necessarily been that of keeping peace with cattle and sheep men, (we did not want to hurt their feelings, run up against appeals, or cause any agitation against the Forests) and also to secure as much revenue as possible in order to make a good showing to Congress in making the National Forests self-supporting.

What would be done on national forest ranges if each unit and allotment were handled just as you would handle it if you personally owned the land? First, I believe, we would reduce stocking from 25 to 50 per cent on many areas and get rid of about 50 per cent or more of the permittees who we have been working with for years, trying to coax them not to put stock on too early, to put salt where it belongs, to ride for their stock, or to practice bedding out with sheep. If we put the same vigor into enforcement of grazing requirements that we do the provisions of timber sale contracts, then the objective of the Manual could be obtained. Perhaps we cannot do this because of political expediency, but if, as has been suggested, we offer to lease grazing lands to the highest bidder, (rather than combat agitation for reduction of fees), rather than our present permit system, then we would accomplish one of two things. Either the present permittees would be willing and eager to follow our range management suggestions, or if we lease the lands to a few men, we would have the opportunity of more easily enforcing any requirements we might wish to make.

The suggestions by Clark presuppose the sample plot method, but are we ready for that? Personally, I do not believe so. Of what value is it to study fenced and unfenced quadrats if we are not going to use the data or stock and manage the ranges as we now know they should be handled. Why prepare beautiful maps and management plans on ranges where we cannot control the number of stock or where we do not, for some reason or other, do the things on ranges that we know should be done if we are going to prevent further serious deterioration of our ranges.

As far as a further definition of regulation G-12, I think everyone knows what the regulation means, and if he were to handle the ranges as if he owned them personally I do not believe there would be any question of being able to meet the objective.

Whether or not the Forest Service can take the chance of the antagonism of stock interests is a question not for supervisors but for the Forester's office to decide. All Forests, no doubt, have ranges where reductions should be made, where riders should be required, where sheep outfits fail to follow the bedding out system. There are always excuses for not getting hard boiled. Just now it is the depression. However, we have not lowered our standards in timber sale management. We still require stumps to be cut as low as possible, although it costs more than 18 inch stumps. We require cutting of defective trees which are a total loss to the operator.

My feeling is that the question of range management objectives is one which needs clarification from the Forester's office to determine whether we cannot put standards into effect similar to those on timber sale areas. Mr. Kneipp has recently written relative to higher standards on camp grounds, summer home areas, etc.

C. S. ROBINSON

SANTA BARBARA

SANTA BARBARA, CALIF.

1 (a & b) A "measuring stick" is necessary for the proper application of any kind of management principles. In this case, it is already provided in theory, but not in practice. In other words, the present method of range analysis as determined by reconnaissance, has not yet been simplified to meet the demand of the average man who has to handle the job of range inspection.

2. Composition percentages shown on page 5 and as used on our form 674A, represent the best kind of measuring stick available. The fault of the present system lies mainly in the methods employed in making up the required information. The district ranger may not know his genera and species, but does it really matter?

When one has to go out on the range with a stockman, you must, in order to convince him that his range is overstocked, be able to give him acre per head figures and substantiate it by good understandable reasons. If the inspector knows, for example, what a wet-meadow type should look like on his percentage sheet—86 per cent grass or grasslike plants, 12 per cent weeds and 2 per cent shrubs—this then is something definite. Both he and the cattleman can see it on the ground and can actually work it up together. I have done so on several occasions.

It is not essential that every species be listed, nor is it always necessary that allied technical details be discussed. After four years on intensive

and extensive range reconnaissance work and four years as grazing man on supervisors' staffs, I am convinced of its soundness and value, but our methods of putting it across are certainly not successful. The kind of instruction given at our ranger training camp does not register.

A change should be made by which the fundamentals of good management could be more clearly shown and, if possible, demonstrated on the ground. The methods of securing necessary data must be simplified if we expect to continue our present methods. Granted that the "variables" are more in range management than in most service activities, and that density is not as tangible a thing as, say, board feet, the facts remain that we have not yet demonstrated that our ways of securing basic data are understood by the majority of our fellow workers.

As a solution to the problem, Mr. Clark has so ably presented in his paper, (and by the way, it has also worried me for years) I offer the following:

(1) That range inspection or management be made only by trained specialists with, say, a minimum of five years' experience as staff men on forests where grazing is of importance. Make it definitely a specialist's job, and limit your range examiners' operations to a group of forests of like vegetative characteristics.

(2) Continue along the lines of present operations, but change the methods and ways of instruction, so that it can be more readily understood by all.

While number 1 is in my opinion the ideal, number 2 is, perhaps, the most logical and will be in line with established procedure.

In the final analysis, class of stock, season of use and numbers are the main factors involved. The first and second are certainly not hard to figure, so numbers are our real problem, and, provided we do not get into hair-splitting details of "coordinate use", etc., etc., simplification should not be a very difficult matter.

L. H. DOUGLAS

REGIONAL OFFICE

DENVER, COLORADO

If I interpret Clark's discussion correctly he asks if a certain composition of vegetation in any range type is not the principal objective in attainment and maintenance of desirable forage production. If that is answered affirmatively he goes on to ask if the average of a large number of descriptions of composition of different areas of a certain type may be taken as indicating the desirable composition of that type.

The first question is remotely fundamental but to me there is a need of such greater importance that I do not worry about that ultimate need. Nature will determine what that desirable composition should be and bring it about, if given the opportunity, without our determining for her what it should be. In fact, if the predetermination of composition were highly important I should say that the ungrazed plot is the best indication of such composition for all type areas of approximately the same site conditions. Averages such as Lister prepared (for a different purpose) and presented in Clark's discussion, would be valueless for this purpose in my opinion.

The greater need that I mentioned above is *attainment of a desirable condition of palatable species in any type*. If all specimens of a given species in a given type are utilized in such a manner that vigor will be maintained, nature will take care of the ultimate composition. This presupposes a detailed knowledge of palatability by species and a standard of average annual utilization of the species. For some time the Service has suffered "growing pains" in connection with recording utilization, and probably some progress has been made.

To my mind we can accomplish desirable seasonal use and distribution and conservative stocking, which really means under-stocking, and thereby bring about the vigor of palatable species needed.

R. W. HUSSEY

APACHE

SPRINGERVILLE, ARIZONA

1. There are any number of so-called "measuring sticks" with which to determine range conditions, but they are all more or less unreliable when used by anyone who has not made a continual study of all of the factors that enter into range conditions. As a usual thing the average forest officer is not and does not pretend to be a range expert (if there are any such animals). The only reliable measuring stick is just ordinary common sense and experience in the particular locality under consideration. (That is my own private opinion and no offense to the so-called range experts.) This measure is provided in rare cases and where it isn't there is probably little to be done except to give the individual experience, until he knows what is good range conditions and what are bad. Judging range conditions is not a matter of great detail in composition, species, or what not. That is a matter that can only be attempted on a small scale in plots or a partial estimate. Incidentally the range estimates are only estimates for a given year. Range conditions change annually with climatic conditions, and an estimate one year may be good and entirely wrong next season. I do not consider there is an honest range problem except for one factor, namely, Proper Stocking. Proper stocking can not be arrived at by estimates, it must be an cut and try method on each individual range and is reached when the season closes and there is plenty of feed left on the ground. To say any percentage of feed would be a rash statement because no two men ever agree or even know what the percentage left may be. Also what is proper stocking one year may not be another. Our managements must be flexible enough to handle the problem each year. To do this we can not stock to the "last head".

When we forget and discard some 98 per cent of the range management bunk and get down to a solid foundation of proper stocking and keeping our ranges so that to the ordinary person they give the appearance of having been only slightly used, we will begin to solve the Range problem. A "high power Range Management Plan" is nothing except an excuse to overgraze the range. Range Management and Range plans all come back to stocking and just ordinary common sense. It isn't and can never be made a science or very scientific. Science needs some basic facts for a foundation, Range Management is based entirely on a set of estimates which are usually only some man's guess and hardly deserve the title of estimate.

I do not think we are lacking anything but that we have entirely too much pseudo-science and too many guesses. Everything in Range Management is confused and covered over with a lot of "hooey" regarding compositions, types and what not. It is no wonder the stockmen tolerate our ideas and look on the forest ranger as a good fellow but just a little insane at times. In fact, they often take the attitude of the man kicked by the jack-ass, "consider the source and let it go". If any of the above is offensive, just consider the source.

A. A. SIMPSON

BEAVERHEAD

DILLON, MONTANA

1. (a) Yes. (b) Yes.

2 & 3. The National Forest Manual sets up two important requirements as objectives in range management—"the Forest Service will allow the use of the forage crop as fully as the proper care and protection of the forests and water will permit", and "every effort will be made to promote the fullest possible use of grazing resources". We are charged, therefore, with the maintenance of a maximum production of palatable forage and its utilization to the fullest degree. Between these two requirements lies the objective of range management that will provide the "approved specifications" for the use of any given type of range.

Granting that we have definite knowledge of the extent, composition, conditions, etc. of the forage resource (grazing survey), it becomes necessary to know how this resource must be managed so as to provide a maximum of forage and, also, a maximum of beef, wool, and mutton.

Clark proposes that certain compositions, by types, be set as the definite "stick" to measure against, but does not explain how the inspector is to accurately determine if changes in composition are occurring, by a simple method. I presume the use of quadrats, periodically measured, is to give these data? Again, the term "grass 80 per cent" is misleading unless the species are known. A type 80 per cent grass made up of 75 per cent stipa, 25 per cent Idaho fescue, will bear no comparison to one that is 75 per cent Agropyron Smithi and 25 per cent Blue gramma. To my mind it will be necessary to determine the key plants in each type, and through research determine the degree of utilization these key plants will withstand, and produce a maximum of forage. This is a subject for our research organizations. Based upon controlled stocking, by classes, carrying capacity factors may then be determined for each type. These factors may then be applied, as the ratio of stocking, and inspection can measure against this stocking, plus other sub-objectives such as distribution, etc. As a matter of fact, in the wheatgrass-gramma ranges of the Great Plains area, it is fairly definitely established that use that will maintain the wheatgrasses will provide the maximum amount of forage and fully protect gramma and other less palatable species. Is not our objective here the maintenance of the maximum production of wheatgrass and the degree of stocking, by cattle, as already well determined by the local Poker Jim carrying-capacity experiment?

Incidentally, under-stocking that minimizes the distribution problem by wasting those areas unutilized so as to not over-utilize more favored sec-

tions of range is, I take it, a violation of our range management objectives.

ROBERT V. BOYLE

CIBOLA

ALBUQUERQUE, NEW MEXICO

I am sure that all of us who have given the matter any thought have felt the need of a "measuring stick" as Mr. Clark expresses it. It is believed that we all understand in a general way what the range management objective is but what we lack is a means of definitely expressing the degree of attainment.

Mr. Clark's method does not appear to be workable to me. The method most plausible to me may seem ambiguous to him.

Forage composition will vary greatly according to slope, exposure, altitude, precipitation and soil formation. Do we know what composition is desired? Opinion varies among experts in regard to whether or not a highly palatable browse species representing 10 per cent in a stand should be maintained or sacrificed.

Physical condition of the soil seems to me to be the best thing to work on in devising a measuring stick. In this, not only qualitative but quantitative factors must be considered, forage density especially because an increase in density means a decrease in the quantity of erosion.

On several Forests on which I have worked we have used as an objective in range management plans a clause which in substance is as follows: The restoration and maintenance of a protective cover of vegetation of high forage value that will check erosion, conserve moisture, and build up the fertility of the soil. To regulate the use of forage to a degree that will insure its own sustained productivity as well as other forest resources.

Surely there is no Forest on which there is no area even though small that does not represent a condition that we are satisfied with and about which we can say: This is a model piece of this earth that we can use as a pattern to work from. It will be asked: Then why can't these sites be analyzed and their condition in all respects be set down on paper in concrete terms? Simply because on a single Forest Unit there may be ten different browse types with a different browse species predominating in each type and in the oak browse type alone the composition may vary from 20 per cent browse, 80 per cent grass on one area to 95 per cent browse, 5 per cent grass on another area and all types still be in excellent condition.

On most ranges in the Southwest, because of irrigation in the lower valleys the land is chiefly valuable as a watershed. Erosion then is the action that must be watched most closely. Even on ranges where grazing ranks prior to watersheds, erosion must be held to the minimum if we expect to hold the top soil which alone can support the more valuable forage species.

I would say that the degree of soil movement would be the best means of specifying range conditions as a general rule on ranges with any drainage system at all. Of course there are exceptions to most rules. There are areas of flat topography where there is practically no soil movement and on which forage composition is not satisfactory. Also occasionally one finds a hilly country of sandy soil formation where erosion is negligible and where weeds have taken the place of valuable grasses. On these areas

undoubtedly, consideration must be given to species and composition. Any formula in range research must be accompanied by handmaidens. An advocate of a composition measuring stick could not ignore density or erosion; neither could I in supporting the soil movement method stand alone and exclude such items as overgrazing indicators, composition, density, etc. For this reason, a brief, definite and infallible measuring stick seems hopeless of attainment. However, as most of our ranges are mountainous or rolling and subject to erosion, it seems that if some means could be devised for expressing the degree of soil movement, even if in general terms, that much of the uncertainties would be eliminated.

Soil formation is a very important factor influencing carrying capacity. But even the average Forest Officer without geological training can recognize the relative values of soils derived from and associated with the following rock formations: sandstone, limestone, granite, rhyolite, basalt (malpais), diabase and quartzite. In judging range condition by extent of soil movement one would not necessarily need to be versed in ecology and other technical subjects in botany.

Since the rate of erosion will vary greatly with a given type and density of forage in different soil types it is doubtful if the rate of soil movement for administrative purposes can be expressed in anything but general terms such as the following: latent, quiet, slow, accelerated, active, destructive, advanced, irreparable.

The following is suggested as an objective for range management: The regulation of the numbers of stock, seasons of use and distribution of stock over the range until that condition exists where erosion is slow or quiet if not latent and forage is predominantly if not totally what one should expect to find in the environment.

It is believed that in reaching this objective all other forest resources will have been taken care of automatically. Soil movement is the pulse upon which we may most easily put our finger. If erosion is destructive or even accelerated we know immediately that all is not well without figuring the relation of weeds to grass and grass to browse. There is time enough afterwards to speculate on this. What we need is action without delay in reducing numbers of stock, etc., before it is too late. If we wait for a *definite* measuring stick (which none of us are doing) we will eventually find ourselves surrounded by a waste such as exists in Asia Minor and China, where flocks once roamed on every hill. I doubt if there is a man in the Service who will ever be able to say definitely for every type of range just what that degree of stocking should be below which the range will improve and above which it will deteriorate. We must accept our reconnaissance figures for what they are worth and allow a margin of safety. Then through trial we will some day know what each unit of range will carry and provide for "sustained productivity".

E. D. SANDVIC

BEAVERHEAD

DILLON, MONTANA

1. (a) Yes. (b) Yes.

2. It is recognized that management of ranges should be directed toward the perpetuation of the most valuable plants. all factors considered

in the greatest quantity possible. To date we have not reached the point of stating in our objectives that the Jim Crow range will be so managed, that forage composition will consist of 80 per cent grass, 15 per cent weeds, and 5 per cent shrubs; 70 per cent of the grass to be *Agropyron smithii*, 90 per cent of the weeds to be *Balsamorhiza sagittata*, and the shrubs to be sagebrush, etc. Perhaps in the future that will be done. It is very doubtful, however, if such a statement will ever be used as a current operating objective or measuring stick by line executives. The reasons are obvious. Vegetative changes for the most part are slow and cannot be detected empirically with any degree of accuracy. In the inspection of a range supporting numerous sub-types within major types, it would be extremely difficult to determine with any degree of accuracy the weighted percentages prevailing for the entire range, and to detect a shifting of those percentages. Detecting changes in forage cover is usually accomplished by use of quadrats, which require detailed measurements and observation. Use of the quadrat method is too time-consuming to undertake, and a more expedient method must be found.

Rather than term Mr. Clark's supposition a "measuring stick", I think it more nearly fills the bill as an objective point. To measure is to determine the extent, quantity, capacity, or dimensions of anything. Mr. Clark has set up the extent, quantity, etc., but he has yet to design the "stick". His paper begins with a discussion of objectives, but later he presents what he terms "a definite measuring stick" for use in measuring qualitative forage conditions. Following through his discussion this "measuring stick" is called "approved specifications" which I believe is the correct term to apply to the data he gives. Without question, a set of approved specifications would clear up the present cloudiness which surrounds "permanency of forage production", "sustained productivity", etc. Emphasis in the manual is placed upon the amount of palatable forage to be left, and the Regional Forester is instructed to determine the amount for each important type and set of range conditions occurring. This is accomplished in part at least by issuing letters of authorization for the carrying capacities of the ranges, and our present measuring stick is the animal month which measures the amount we charge against that authorization. This "stick" does not lack the elements of definiteness, facility of application or useability. It provides a definite control measure for management. If failure occurs it's because the yield to be taken was set erroneously, not because the "measuring stick" didn't work. The thing to determine, then is the *yield* that will maintain a cover of 20 per cent weeds, 70 per cent grasses, and 10 per cent shrubs, if that is found to be the acceptable standard.

3. Knowledge is needed of the degree or intensity of grazing that will promote the growth of desirable and retard or kill undesirable species. For instance, if a forage stand is comprised of 80 per cent *Stipa comata* and 20 per cent *Agropyron tenerum*, will grazing only 25 per cent of the total volume of forage produced eventually produce the change desired? It is already known that on over-grazed range where some of the common species of sagebrush have become predominant. that with protection desirable grass species have succeeded in reducing the amount of sagebrush. The intensities of use that will produce these changes I do not believe are

known and is, perhaps, one of the problems the experiment stations are directing their efforts towards.

C. A. KUTZLEB

REGIONAL OFFICE

DENVER, COLORADO

A specific objective, a measuring stick for range management, something that can be observed and recognized infallibly by range administrators would be a godsend to range administrators. We may in time develop such an objective. A certain mixture or composition for any type, expressed in percentages of weeds, grasses, and shrubs may be the answer. Do we have sufficient information concerning composition to be able to say that any certain composition is the proper one or the one which can be and should be maintained? Can the composition of any type be uniform over large areas? Is or will it be easier to estimate percentages in determining composition than it is to decide whether or not the proper standard of utilization, as given in Reg. G-12, is being attained?

I do not say that the measuring stick, as proposed by Clark, is not the desirable one or can not be used, but I do think that it would be extremely difficult to set up and apply such a standard. Our grazing reconnaissance figures are estimates. The application of the standard will require more estimates. Will averages for large areas fit any particular portion of that area?

The more I work with type composition as represented by data secured from quadrats, the less sure I become that quadrat data will have any general application to the unit or type in question. I started out with a hazy idea that a study of sufficient plots in any type would give an average composition which would represent an ideal or at least an acceptable condition, and that this average composition could be expressed in terms which could be readily recognized and applied on the ground. The idea is still hazy. In fact, I am less sure than I was.

Clark proposed to ignore palatability and density. Palatability is a factor that seems to remain fairly constant regardless of composition, but density apparently decreases with a decrease in the plant cover from a climax to a lower stage. Thus a bunchgrass type would have about the same palatability regardless of whether the composition was 90 per cent grass and 10 per cent weeds, or 10 per cent grass and 90 per cent weeds, the grass being replaced by weeds of about the same palatability. Density, however, in the latter case would be less. Density, as here used, means charting density or density at the ground, which is of considerable importance in preventing erosion.

The above are based on a study of quadrat data on many different types of varying composition. Perhaps they are not true, but there seems to be a tendency in this direction which additional studies will either confirm or disapprove. Can density which is so important from a soil conservation standpoint be ignored? If not, it adds another complicating factor to our measuring stick. Another factor which is also estimated.

Any definition of proper range conditions based on type composition, applicable over a wide area as represented by a Forest Service district, would necessarily be rather vague and indefinite to include all the various condi-

tions which would be encountered. Take aspen, for instance—the percentages recommended are: weeds 40 per cent, grass 30 per cent, and shrubs 30 per cent. Undoubtedly they would apply to many aspen ranges, but I am familiar with one particular range on which the composition has remained fairly constant under grazing at about 50 per cent grass and 30 per cent weeds. A special case? To be sure it is a special case, but must we not consider each unit, or each type on the unit, as a special case to receive individual treatment. If so, how can any Region-wide percentages apply?

It seems more logical at the present time to set up a standard for each type on each range than to attempt to apply a general mandate to all specific conditions. Or if we must have a more definite standard to shoot at, should it not be Service-wide rather than Regional?

Why not be conservative about the grazing? Is it necessary to utilize the last possible mouthful of forage? I remember reading a statement by someone that on a certain range it was necessary to over-utilize 3 to 5 per cent of it each year in order to get proper utilization on the balance. Can you indefinitely over-utilize even 3 per cent of a range? It would seem preferable to waste a little feed rather than to over-utilize and hope for the best. No one would suggest that a business could keep on indefinitely if 3 per cent of its capital was used each year for operating expenses. Is not over-utilization merely drawing on capital?

It may be the lazy man's method, but conservative stocking, a little feed left in bad years and considerable in good year, will automatically solve the problem and result in proper composition, density, utilization, and all the other factors which will maintain our capital, our business, in a sound condition. We will lose a little interest, but will avoid the depression which otherwise is likely to occur.

JOHN H. HATTON

REGIONAL OFFICE

DENVER, COLORADO

It seems to me that we can easily get into pretty deep water and clearly out of the realm of practicability if we attempt to prescribe a *precise* measuring stick which will be "fool-proof" for every type of range. By that, I mean a measuring stick as general and inclusive as each broad type under our range reconnaissance classification. That, in itself, is pretty broad although worked out in rather specific percentages. Reconnaissance and other studies, however, have helped to better focus our eyes and refine our guessing, which is considerable of a step forward.

I think we are agreed on the broader objectives, namely, such uses as will sustain the productivity of the forage, as far as that may be practical. But even that objective must give way, progressively, or temporarily as between seasons and over periods of years, in its area and quantitative phases, on many units of range, to such crowding and limiting and changing factors as forest reproduction, classes of stock, periods of drouth, lowering of water tables, erosion from whatever cause, and a multitude and maze of other factors. We are not measuring a constant in the very nature of things. The acreage and volume of our so-called optimum forage now will be reduced gradually and almost imperceptibly from year to year within

many of our broad types in spite of all we may try to do about it and we we didn't graze the ranges at all. That results from fire protection alone. Any measuring stick would have to be changed from time to time to keep up with these inevitable transformations influenced by other than grazing factors.

Let us start, for instance, with what we conclude now is the proper relative percentage of grass and weeds for given types. That may be very good as far as it goes, but who is going to prescribe a measuring stick or control factor which will keep new forests, drouth, water tables, fires and all other changing factors in equilibrium? And how are we going to handle our live stock and ranges each current season to fit into all these cross currents which upset or modify our major objective, and keep us from maintaining a more or less fixed percentage of weeds and grasses from season to season?

Many attempts have been made to work out utilization studies, and none that I know of have so far proved practical, because of the many qualifying factors which occur with varying intensities from year to year. Our weeds or grasses may be one-fourth to two-thirds in height growth or volume this year, as compared to last, or they may be 2 or 3 times greater. Some species may not seed normally this year and the percentages may be affected thereby. We continue to use the range, even conservatively, with sheep, and our weed percentage gradually and inevitably gives way to grass; or we continue cattle on a given range, and weeds come into ascendancy, and still each class of range may be in good condition when we consider the total forage and protective cover.

If we could have a measuring stick which would eliminate or account for a given element and would take care of these varying factors and conditions, it might be fine. If we could work out a formula by which we could say a sheep range becomes a cattle range with a certain percentage grass and we should change it to cattle, it would be fine, and vice-versa. But this has more to do with livestock benefits than range cover and protection. As an example, a species of andropogon on the Wichita Forest in 1932 is two or three times as tall and rank as it has been for the past several years of drouth. Other species are relatively vigorous. A plant expert from one of the universities, who visits the Wichita from year to year, stated that the inherent come back of the Wichita forage in the more favorable seasons makes it impossible to overgraze the types that prevail in that region, especially under our present average intensity of grazing, which we have considered too heavy on some units. Yet we have to admit the come back in a single season like 1932 is remarkable. A measuring stick would thus have to prescribe broad averages and make full allowances for the lean and fat years that inevitably come and go. The Wichita is no special exception in National Forest ranges in this matter of seasonal changes and variable forage productivity.

If we could deal with stabilized factors and if we could instruct our cattle and sheep to eat so much of this and so much of that, if we could eliminate the appetite tendencies of our ruminants as affected by such physical factors as climate, soil, topography, and plant associations, which make one plant sought in this association and on this unit, and non-attrac-

tive in others, it may be we could lay our ruler down and say this measures too much and this measures too little. We know, for instance, we cannot graze the big bunch grass type, even so called normally, with cattle, and maintain that species in anything like its climax stages. Other plants, just as good and better, however, may and do come in to take its place. On the other hand, conservative sheep grazing and even quite heavy sheep grazing, according to locality, may leave this type like fields of waving grain.

The percentages given in Supervisor Clark's article for different types were measured a number of years ago. The percentages, if measured today, would no doubt show marked changes from previous estimates. They showed, or we presumed to show at that time, that the Rio Grande was too heavily stocked. The forage acres stated that so many cattle and so many sheep could be cared for. Reductions were made but never to the indicated figures, but attention was given to the elimination of lambing and early seasonal use, through period or plant growth studies, etc., which had been set up some years before. The ranges have improved, capacities have increased, larger numbers of stock are being now accommodated, but the factors responsible, up to this time, have been largely the elimination of well known abuses, such as we have been eliminating on all Forests as rapidly as it has been practical to do so. No thought, up to this time, has been given to the percentages of weeds and grasses that were found several years ago under the reconnaissance survey. But the ranges have improved and the Rio Grande predicts that capacities will be cut in two in 50 years or thereabouts by the encroachment of timber, even though we are now in a cycle of increasing capacities through attention to past overgrazing and abuses. This is not saying that we should not give thought to these factors, however, if that will improve our capacity calculation in a practical way progressively from year to year.

It is not my purpose to discourage thought or experiments on this question. I am simply stating a few practical and every day phases of range administration that have come to my notice in long years of observation, leavened, I think, with a strong leaning toward the more scientific approach to our range problems and uses.

We have now, under Regulation G-12, something of a measuring stick and one which, if observed, would work wonders in rehabilitating over-used ranges. This measuring stick is the suggestion that around 25 per cent of the palatable species be permitted to produce seed, but even that method of measuring is affected from year to year by the various insinuating factors previously mentioned and indicated in this discussion. **We must be able to** appraise and make allowance for these factors from year to year in practical range management.

We have had for many years Dr. Sampson's species indicators of **overgrazing** and plant succession charted and discussed. Maybe some of our range men can experiment with Clark's suggestion and make it useful. I am not clear whether the discussion in Lesson 12 is intended to set up a protective cover standard or whether it seeks to measure the ultimate in safe utilization. Considering the main purposes of the National Forests, should we seek the last ounce in range utilization? And should we crowd to the last inch our margins of safety? Both the range and such livestock

as are permitted will fare a lot better if we lean more to conservatism. Our administration problems will be less and I believe communities in their various interests will be better served under such a policy.

In the mean time, let us profit by our period studies in controlling the one great factor in range abuse, namely, too early use, and dispense with such uses as interfere with the proper normal development of our palatable plant species; let us measure our quantities of forage through the preparation of good type maps reduced to forage acres, if you wish, as a common denominator but not using these acres necessarily as an absolute measure of capacity. Relatively they may be very helpful in appraising or comparing unit capacities. Let us give heed to the measuring stick already set up under Regulation G-12 and permit our palatable species to seed and reproduce in the average season; let us use our quadrats to secure ideas and facts; let us have currently the proved results of our range experiment stations and profit by them; Let us consider and maintain our ground and soil protective cover according to the possibilities of site; let us consider and endeavor to correct our erosion problems from whatever cause, with special attention to deep gully erosion, which lowers our water tables, and affects range and woody types and destroys watersheds; let us watch our willow types and our aspen reproduction and give these species a chance along water courses and on the general ranges; there may be places here and there where they will inevitably disappear with grazing use because of plant associations and class grazing, but over broad an many specialized areas, I think they should be conserved as a general principle.

Also let us manage our distribution by the various tried and true artificial and other means already known, in a way to give our ranges the chance they are asking for (figuratively speaking) to show what they will do if given an opportunity; let us control our capacities with a little more reference to the abnormal short-growth season rather than the so-called normal or average season; and let us also recognize that present seemingly climax range types in their natural state may assume a different climax without use, or even under conservative use, as brought out by class grazing or the encroachment of other types such as timber.

If we do all this, which the Rio Grande and many other Forests have already done or are doing, we can take a little more time and scientific approach in working out a so-called measuring stick, which may be helpful in more refined administration. But meantime, in my judgement, we can be sure that we are headed in the right direction in range management, even though we have not yet gone by any means all the way.

C. L. VAN GIESEN

ROOSEVELT

FORT COLLINS, COLO.

I will agree with Supervisor Clark that most of our statements concerning forage conditions on a range are based on general observations. The conclusions reached are necessarily dependent upon the personal opinions of the inspectors. It seems quite probable, however, that a series of observations and conclusions on a definite range by one man may be quite accurate and reliable.

There has undoubtedly been considerable energy, both physical and

mental, expended in formulating the qualitative forage table given by Clark. I am wondering how this table can be applied to widely changing forage conditions which result from greatly varying climatic factors. The eastern slope ranges in Colorado have suffered from three years of excessive drought. It is my reaction that under these conditions the percentage of grasses has materially increased, which of course is a desired change on cattle ranges. This has resulted, not by an increase in the density of the grasses, but rather by the death of the less drought resistant weeds. In other words, any "measuring stick" to be reliable should consider quantitative as well as qualitative factors.

The personal factor must be considered in using Clark's table as well as in considering the results of general observations in the past. We would be very optimistic indeed, if we felt that even three or four qualified grazing men could agree on the qualitative percentages or on the densities of a forage type encountered on a range.

I feel that Clark has taken a definite step towards better range management. It would seem that his table should be revised to include a measure of density. Then, the table would have to be used with considerable care in order to eliminate as much of the personal element as possible. With so many variable factors we cannot hope to attain a "fool-proof" measure of range conditions.

R. R. HILL

WASHINGTON, D. C.

I agree entirely with Mr. Clark's statement of the need for clear-cut concrete specifications of the objectives we are attempting to reach in range management. We need to visualize the character of types which we desire to establish and maintain, and to describe the composition of such types—by reconnaissance methods if we choose. I would not discount the need for taking this step nor its importance in a general program designed to clear up the difficulties in the way of securing better range management. My chief criticism is that the proposal to set up clearer conceptions of desirable forage types does not meet all of the *interlocking* group of management needs. These needs as I see them may be stated as follows:

1. Specifications of the composition and density of vegetation we are planning to produce on each range unit.
2. Effective means of measuring the changes that are currently taking place in the composition and density of vegetation to enable us to determine whether we are progressing toward our goal or going down grade.
3. Specifications of the degree of utilization which if applied will lead as effectively as practicable toward the goal in management.

Each of the above needs is unquestionably very important in itself but, as I see the situation, range management will be very inadequately served unless every one of the above group is adequately provided for. It would do little good to have a clear picture of what we are attempting to grow if at the same time we were unable to judge whether or not we were making progress toward the desirable goal and if in addition we did not have specifications as to the degree of use which would enable us to reach the goal

most effectively.

Clark's proposal would serve the first of these needs by providing specifications of desirable types. A reconnaissance type description could be used to advantage and could be made as specific as the needs and as the available information would permit. Supplemental descriptions would be required to visualize the objective where, for example, a badly depleted meadow would have to be restored; where a strip tributary to a driveway would necessarily be badly trampled and abused; where, due to lack of water or rough topography portions of types could not be fully utilized; where because of sterile soil limited areas would support much less than the general type, etc. The scheme could be used to a degree in measuring the current changes in forage composition and density and thereby indicate the degree of progress toward the established objective. That is to say, by comparing estimates of composition and density made at intervals an idea could be gained of at least the more striking changes in vegetation. In order to furnish the needed information accurately enough to be used as a safe guide in management it is quite probable that the vegetative changes would have to be measured mechanically rather than ocularly, but that is a matter of detail which need not affect the general proposal.

Clark's proposal is inadequate, in my judgment, in that it does not provide for a definition of the degree of use that should be made of the forage if we expect to arrive satisfactorily at the goal of proper management. In forest management we may have a clear conception of the desired composition of timber types and we may have measures of the changes in types occurring on areas cut over in the past, but unless we organize our information so as to provide specific marking rules by which the man in the woods in charge of the timber sale may regulate the extent to which various species should be removed, the number of trees of each species that should be left for seed, etc., the other information regarding the desirable ultimate type and the progress of reproduction on cutover areas will assist very little in promoting effective management. If I may carry the comparison a little farther, neither the man in charge of the timber sale nor the ranger in charge of grazing on a specific allotment needs to know the ultimate objective in composition and density of the vegetation with which he is dealing or the changes that are taking place as a result of the management in effect. True, *someone* needs this information before adequate specifications can be drawn up regulating the harvesting of the timber or forage crop. The man immediately in charge of the timber sale or grazing district must have, if he is to function efficiently, marking rules or utilization standards that fit the specific conditions with which he is dealing. In the light of this analysis Clark's proposal is sound and workable as far as it goes but it is too restricted; it doesn't place a finger on the most critical need of the man who is directly responsible for results in range management and it does not provide the working tool most needed to assist him in redeeming his responsibility.

Perhaps I have not fully expressed my opinion regarding the last question asked by Keplinger—i. e., "Just what, in your opinion, is needed or lacking and how are we going to get it? I have explained that in my judgment the big element lacking in Clark's program is "specific utilization

standards". By that term I mean a clear-cut, concise description of the condition in which key-plants should be left at the end of the grazing season in order to permit satisfactory progress toward our goal in management. We need such a definition for our overgrazed meadows, depleted browse types, undergrazed bunch-grass slopes, lightly used pine grass areas in lodgepole, etc. I have explained that the utilization standards should provide specifically for undergrazed and overgrazed conditions where they can not be avoided, as well as for proper grazing. The definitions should be based upon the best knowledge available and should be prepared by the local ranger, forest supervisor and a representative of the regional office. There should be sufficient correlation between the ideas of the Washington Office and the Regional Offices to assure full consideration of service-wide objectives. In character, the standards should be a concise word picture of the condition which we desire to see prevail on the range including a statement of the portion of important plants that should be left ungrazed. It is believed that it is practicable to develop such standards and that they are essential as guides to enable every forest officer responsible for range administration and every permittee to meet his responsibility effectively in bringing about proper range management.

